

**WEST**[Generate Collection](#)[Print](#)**Search Results - Record(s) 1 through 1 of 1 returned.**☐ 1. Document ID: US 20030153466 A1

L3: Entry 1 of 1

File: PGPB

Aug 14, 2003

PGPUB-DOCUMENT-NUMBER: 20030153466

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20030153466 A1

TITLE: Phillpsitic zeolite soil amendments

PUBLICATION-DATE: August 14, 2003

## INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Allen, A. John	Bethesda	MD	US	
Braum, Sebastian	Kansas City	MO	US	

US-CL-CURRENT: [504/358](#); [502/64](#), [502/67](#), [502/87](#), [71/23](#)

Full	Title	CIT.1	REV.1	CLS.1	REF.1	SEQ.1	ATT.1
1	1						

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Terms	Documents
11 same L2	1

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<u>Set Name</u> side by side	<u>Query</u>	<u>Hit Count</u>	<u>Set Name</u> result set
<i>DB=USPT,PGPB,JPAB,EPAB,DWPI; PLUR=YES; OP=ADJ</i>			
<u>L14</u>	yenomite	0	<u>L14</u>
<u>L13</u>	l1 same L12	1	<u>L13</u>
<u>L12</u>	grow\$3 near5 (medium or media or soil\$1)	82795	<u>L12</u>
<u>L11</u>	l1 same L10	0	<u>L11</u>
<u>L10</u>	grow near5 (medium or media or soil\$1)	14933	<u>L10</u>
<u>L9</u>	l7 not l3	13	<u>L9</u>
<u>L8</u>	l7 not l3L7	14	<u>L8</u>
<u>L7</u>	l5 and L6	14	<u>L7</u>
<u>L6</u>	horticultur\$6	25804	<u>L6</u>
<u>L5</u>	l1 same L4	444	<u>L5</u>
<u>L4</u>	zeolit\$6	74010	<u>L4</u>
<u>L3</u>	l1 same L2	1	<u>L3</u>
<u>L2</u>	jordan\$4	37344	<u>L2</u>
<u>L1</u>	phillipsit\$4 or philipsit\$4	485	<u>L1</u>

END OF SEARCH HISTORY

**WEST****End of Result Set**☐ **Generate Collection** **Print**

L3: Entry 1 of 1

File: PGPB

Aug 14, 2003

PGPUB-DOCUMENT-NUMBER: 20030153466  
PGPUB-FILING-TYPE: new  
DOCUMENT-IDENTIFIER: US 20030153466 A1

TITLE: Phillipsitic zeolite soil amendments

PUBLICATION-DATE: August 14, 2003

## INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Allen, A. John	Bethesda	MD	US	
Braum, Sebastian	Kansas City	MO	US	

## ASSIGNEE-INFORMATION:

NAME	CITY	STATE	COUNTRY	TYPE CODE
ASI SPECIALITIES, LTD.	Washington	DC		02

APPL-NO: 10/ 024225 [PALM]  
DATE FILED: December 21, 2001

INT-CL: [07] A01 N 25/00, C05 F 11/00, B01 J 29/06, B01 J 29/04

US-CL-PUBLISHED: 504/358; 502/64, 502/67, 502/87, 71/23

US-CL-CURRENT: 504/358; 502/64, 502/67, 502/87, 71/23

REPRESENTATIVE-FIGURES: 10

## ABSTRACT:

An agricultural and horticultural plant growth zeolite-based composition containing a particular zeolitic (i.e., zeolite-containing) material, termed "Jordanite," is disclosed. This composition exhibits a collection of outstanding advantageous properties in agricultural and horticultural applications. Jordanite, which is found in a particular area of Jordan, comprises primarily phillipsite as the zeolite, optionally in conjunction with palagonite. Jordanite provides surprisingly better results as compared to when other zeolite-based soil amendment compositions, even when it is used as the mined material that has been only subject to a grinding or crushing operation to a desired mesh size. As mined, Jordanite contains very low levels of undesired Na.sup.+ ions. It can, therefore, be used without being subjected to a washing operation to remove these ions. Jordanite also possesses a very high CEC. These characteristics, and others, make Jordanite uniquely suitable to use in any agricultural or horticultural operation.

**WEST**[Generate Collection](#)[Print](#)**Search Results - Record(s) 1 through 10 of 13 returned.**☐ 1. Document ID: US 20030172697 A1

L9: Entry 1 of 13

File: PGPB

Sep 18, 2003

PGPUB-DOCUMENT-NUMBER: 20030172697

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20030172697 A1

TITLE: Fertilizer manufactured from animal wastes and method of producing same

PUBLICATION-DATE: September 18, 2003

## INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Sower, Larry P.	Milford	UT	US	

US-CL-CURRENT: 71/11

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KMC
Draw	Desc	Image								

☐ 2. Document ID: US 20030084693 A1

L9: Entry 2 of 13

File: PGPB

May 8, 2003

PGPUB-DOCUMENT-NUMBER: 20030084693

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20030084693 A1

TITLE: Methods for producing fertilizers and feed supplements from agricultural and industrial wastes

PUBLICATION-DATE: May 8, 2003

## INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Sower, Larry P.	Milford	UT	US	

US-CL-CURRENT: 71/11

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KMC
Draw	Desc	Image								

☐ 3. Document ID: US 20020124613 A1

L9: Entry 3 of 13

File: PGPB

Sep 12, 2002

PGPUB-DOCUMENT-NUMBER: 20020124613  
PGPUB-FILING-TYPE: new  
DOCUMENT-IDENTIFIER: US 20020124613 A1

TITLE: Methods for producing fertilizers and feed supplements from agricultural and industrial wastes

PUBLICATION-DATE: September 12, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Sower, Larry P.	Milford	UT	US	

US-CL-CURRENT: 71/11

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KMC
Draw. Desc	Image									

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☐ 4. Document ID: US 6497741 B2

L9: Entry 4 of 13

File: USPT

Dec 24, 2002

US-PAT-NO: 6497741  
DOCUMENT-IDENTIFIER: US 6497741 B2  
**\*\* See image for Certificate of Correction \*\***

TITLE: Methods for producing fertilizers and feed supplements from agricultural and industrial wastes

DATE-ISSUED: December 24, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Sower, Larry P.	Milford	UT		

US-CL-CURRENT: 71/11; 71/12, 71/14, 71/15, 71/21, 71/23, 71/25, 71/28

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KMC
Draw. Desc	Image									

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☒ 5. Document ID: US 6409788 B1

L9: Entry 5 of 13

File: USPT

Jun 25, 2002

US-PAT-NO: 6409788  
DOCUMENT-IDENTIFIER: US 6409788 B1  
**\*\* See image for Certificate of Correction \*\***

TITLE: Methods for producing fertilizers and feed supplements from agricultural and industrial wastes

DATE-ISSUED: June 25, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Sower; Larry P.	Milford	UT		

US-CL-CURRENT: 71/11; 71/12, 71/14, 71/15, 71/21, 71/23, 71/25, 71/28

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KMC
Draw Desc	Image									

☐ 6. Document ID: US 6271174 B1

L9: Entry 6 of 13

File: USPT

Aug 7, 2001

US-PAT-NO: 6271174

DOCUMENT-IDENTIFIER: US 6271174 B1

TITLE: Method of and products for promoting improved growth of plants and more water-efficient growing soil or other media and the like with antzeolite crystals treated with preferably water-based plant-derived nutrient extractions and the like

DATE-ISSUED: August 7, 2001

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Rines; Robert H.	Concord	NH		
Toth; Lisa	Norwell	MA		
Toth; Suzi Rines	Norwell	MA		

US-CL-CURRENT: 504/116.1; 424/400, 424/417, 424/421, 424/490, 424/740, 424/DIG.10, 504/101, 504/113, 504/118, 504/189, 504/361, 514/919, 514/964, 71/23, 71/64.07, 71/64.11

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KMC
Draw Desc	Image									

☒ 7. Document ID: US 5900387 A

L9: Entry 7 of 13

File: USPT

May 4, 1999

US-PAT-NO: 5900387

DOCUMENT-IDENTIFIER: US 5900387 A

TITLE: Method of and products for promoting improved growth of plants and more water-efficient growing soil or other media and the like with zeolite crystals treated with preferably water-based plant-derived nutrient extractions and the like

DATE-ISSUED: May 4, 1999

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Rines; Robert H.	Concord	NH		

US-CL-CURRENT: 504/116.1; 424/740, 504/101, 504/113, 504/118, 504/189, 504/361, 71/23, 71/64.07, 71/64.11

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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KMC

☒ 8. Document ID: US 5451242 A

L9: Entry 8 of 13

File: USPT

Sep 19, 1995

US-PAT-NO: 5451242

DOCUMENT-IDENTIFIER: US 5451242 A

TITLE: Active synthetic soil

DATE-ISSUED: September 19, 1995

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ming; Douglas W.	Houston	TX		
Henninger; Donald L.	Houston	TX		
Allen; Earl R.	Stillwater	OK		
Golden; Dadigamuwage C.	Houston	TX		

US-CL-CURRENT: 71/36; 423/311, 502/64, 71/51, 71/53, 71/61, 71/63, 71/64.11, 71/903, 71/904

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
Draw Desc	Image								

KMC

☒ 9. Document ID: US 4986989 A

L9: Entry 9 of 13

File: USPT

Jan 22, 1991

US-PAT-NO: 4986989

DOCUMENT-IDENTIFIER: US 4986989 A

TITLE: Zeolite fungicide

DATE-ISSUED: January 22, 1991

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Sirosita; Masao	Nishinomiya			JP
Mizutani; Masato	Toyonaka			JP
Kimura; Shigeko	Otsu			JP
Oguri; Yukio	Chaville			FR
Kitamura; Masaru	Takatsuki			JP
Umada; Youichi	Takatsuki			JP
Sato; Hiroshi	Niihama			JP

US-CL-CURRENT: 424/635

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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KMC

☐ 10. Document ID: US 4963431 A

L9: Entry 10 of 13

File: USPT

Oct 16, 1990

US-PAT-NO: 4963431  
DOCUMENT-IDENTIFIER: US 4963431 A  
  
TITLE: Zeolite-impregnated pads  
  
DATE-ISSUED: October 16, 1990

INVENTOR-INFORMATION:				
NAME	CITY	STATE	ZIP CODE	COUNTRY
Goldstein; Joel M.	Ambler	PA		
O'Malley; Thomas M.	Uxbridge	MA		

US-CL-CURRENT: 442/149; 428/219, 428/360

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	KMC
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L9: Entry 11 of 13

File: JPAB

Jun 20, 1989

PUB-NO: JP401156905A

DOCUMENT-IDENTIFIER: JP 01156905 A

TITLE: FUNGICIDE FOR AGRICULTURAL AND HORTICULTURAL USE

PUBN-DATE: June 20, 1989

## INVENTOR-INFORMATION:

NAME

COUNTRY

SHIROSHITA, MASAO

MIZUTANI, MASATO

OGURI, YUKIO

KIMURA, SHIGEKO

KITAMURA, MASARU

UMADA, YOICHI

SATO, HIROSHI

INT-CL (IPC): A01N 61/00

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KMC
Draw	Desc	Clip	Img	Image							

☐ 12. Document ID: EP 306035 A2

L9: Entry 12 of 13

File: EPAB

Mar 8, 1989

PUB-NO: EP000306035A2

DOCUMENT-IDENTIFIER: EP 306035 A2

TITLE: Copper-containing zeolite fungicides.

PUBN-DATE: March 8, 1989

## INVENTOR-INFORMATION:

NAME

COUNTRY

SIROSITA, MASAO

MIZUTANI, MASATO

KIMURA, SHIGEKO NEE NAKAMURA

OGURI, YUKIO

KITAMURA, MASARU

UMADA, YOUICHI

SATO, HIROSHI

US-CL-CURRENT: 424/635  
INT-CL (IPC): A01N 59/20; C01B 33/28  
EUR-CL (EPC): A01N059/20; C01B039/02

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	RWC
Draw Desc	Clip Img	Image									

☐ 13. Document ID: EP 306035 A AU 8820547 A BR 8804526 A ES 2011851 A FR 2619991 A GB 2209469 A GB 2209469 B IT 1224721 B JP 01156905 A US 4986989 A

L9: Entry 13 of 13

File: DWPI

Mar 8, 1989

DERWENT-ACC-NO: 1989-070222

DERWENT-WEEK: 198910

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TITLE: Agricultural and horticultural fungicidal compsn. - comprises crystalline zeolite of faujasite, chabazite or phillipsite gps.

PRIORITY-DATA: 1987JP-0222293 (September 4, 1987)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
EP 306035 A	March 8, 1989	E	024	
AU 8820547 A	March 9, 1989		000	
BR 8804526 A	April 4, 1989		000	
ES 2011851 A	February 16, 1990		000	
FR 2619991 A	March 10, 1989		000	
GB 2209469 A	May 17, 1989		000	
GB 2209469 B	January 2, 1992		000	
IT 1224721 B	October 18, 1990		000	A01N
JP 01156905 A	June 20, 1989		000	
US 4986989 A	January 22, 1991		000	

INT-CL (IPC): A01N 12/00; A01N 59/20; A01N 61/00; C01B 33/28

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	RWC
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L9: Entry 1 of 13

File: PGPB

Sep 18, 2003.

DOCUMENT-IDENTIFIER: US 20030172697 A1

TITLE: Fertilizer manufactured from animal wastes and method of producing same

Summary of Invention Paragraph (21):

[0021] European Patent Application No. 79400246.9 discloses a method and facility for deodorizing waste from pig farms and for transforming it into manure. A mixture of the waste and a calcareous solution is decanted and the separated liquid component is oxygenated by compressed air. Odor control methods have been described by S. Barrington and K. El Moueddeb, "Zeolite to Control Swine Manure Odours and Nitrogen Volatilization", in: New Knowledge in Livestock Odor Solutions, International Livestock Odor Conference '95, pp. 65-68, and S. Piccinini, Application of a Phillipsite Rich Zeolite During the Composting of Solid Fractions of Pig Slurry, Materials Engineering, Vol. 5 no. 2 (1994), pp. 375-81.

Summary of Invention Paragraph (28):

[0028] U.S. Pat. No. 5,549,730 relates to a compression molded tablet fertilizer capable of slowly releasing active ingredients and is suitable for use in horticulture and afforestation, and a method for the production thereof.

Detail Description Paragraph (25):

[0135] Clinoptilolite, a natural zeolite, is an example of an efficient and preferred ammonia adsorbing zeolite that can be used to treat the sludge that is discharged from the gas reactors. The use of ammonia adsorbing zeolite in the nutrient recovery process permits the reduction of acrid odors. In addition, odor can be controlled more effectively if an ammonia adsorbing zeolite is added to the livestock feed. The choice of preferred zeolites in this invention is also determined by the required characteristics of the fertilizer that is produced from the organic waste. For example, K--Ca clinoptilolites are excellent for soil conditioning as opposed to Na clinoptilolites. Other zeolites that retain ammonia include chabasite and phillipsite. Because natural sources of zeolites sometimes contain mixtures of zeolites instead of one single zeolite and some zeolites share several common characteristics, the term "zeolites" in this context will refer to one zeolite and also to a mixture of zeolites with desired properties. Analogously, reference to a specific zeolite by name in the context of this specification and appended claims is to be understood as referring to named specific zeolites and also to a mixture of zeolites with the desired properties in which the specifically named zeolite is a significant component.

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L9: Entry 1 of 13

File: PGPB

Sep 18, 2003

PGPUB-DOCUMENT-NUMBER: 20030172697  
PGPUB-FILING-TYPE: new  
DOCUMENT-IDENTIFIER: US 20030172697 A1

TITLE: Fertilizer manufactured from animal wastes and method of producing same

PUBLICATION-DATE: September 18, 2003

## INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Sower, Larry P.	Milford	UT	US	

APPL-NO: 10/ 371803 [PALM]  
DATE FILED: February 21, 2003

## RELATED-US-APPL-DATA:

Application 10/371803 is a division-of US application 10/236525, filed September 6, 2002, PENDING  
Application 10/236525 is a continuation-in-part-of US application 10/139827, filed May 7, 2002, US Patent No. 6497741  
Application 10/139827 is a continuation-of US application 09/235461, filed January 22, 1999, US Patent No. 6409788  
Application is a non-provisional-of-provisional application 60/072372, filed January 23, 1998,

INT-CL: [07] C05 F 1/00

US-CL-PUBLISHED: 71/11

US-CL-CURRENT: 71/11

REPRESENTATIVE-FIGURES: NONE

## ABSTRACT:

Integrated waste treatment and fertilizer and feed supplement production methods to be implemented at organic waste source sites, at remote treatment sites, or partially at the organic waste source site and at a remote location, whether in small or large scale operations. The methods are suitable for retrofitting existing organic waste sources and for treating the organic waste generated by a single source or by a plurality of sources. These methods provide: reduction or elimination of emissions of acrid and greenhouse gases; effluents that meet discharge standards and that can be used in wetland and irrigation projects; organic based, granular, slow release NPK fertilizer of standard composition and size that can be supplemented with micronutrients and soil amendment materials and whose composition can be adjusted to meet demands and needs of specific markets; methane-rich biogas recovery for its subsequent use for heating, for power generation or for catalytic and synthetic processes, and feed supplement including feed supplement for cattle. The methods comprise steps for thoroughly separating suspended and dissolved materials, preventing gas emissions and capturing gases, and minimizing waste disposal. Fertilizer base may be produced by mixing waste with at least one of a phosphate precipitating agent, a base, a flocculant, and optionally with an ammonia retaining agent and a densifier, subsequently separating and drying the precipitate.

Pathogen-free, odor-free and dust-free fertilizer may be obtained by temperature controlled incineration or combustion.

#### CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a division of copending U.S. application Serial No. 10/236,525, filed Sep. 6, 2002, which is a continuation-in-part of U.S. application Serial No. 10/139,827, filed May 7, 2002, which is a continuation of U.S. application Ser. No. 09/235,461, filed on Jan. 22, 1999, now U.S. Pat. No. 6,409,788 B1, which claims priority to U.S. Provisional application Serial No. 60/072,372, filed Jan. 23, 1998, all of which are incorporated hereby reference.

**WEST**

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L9: Entry 5 of 13

File: USPT

Jun 25, 2002

DOCUMENT-IDENTIFIER: US 6409788 B1

**\*\* See image for Certificate of Correction \*\***

TITLE: Methods for producing fertilizers and feed supplements from agricultural and industrial wastes

Brief Summary Text (21):

European Patent Application No. 79400246.9 discloses a method and facility for deodorizing waste from pig farms and for transforming it into manure. A mixture of the waste and a calcareous solution is decanted and the separated liquid component is oxygenated by compressed air. Odor control methods have been described by S. Barrington and K. El Moueddeb, "Zeolite to Control Swine Manure Odours and Nitrogen Volatilization", in: New Knowledge in Livestock Odor Solutions, International Livestock Odor Conference '95, pp. 65-68, and S. Piccinini, Application of a Phillipsite Rich Zeolite During the Composting of solid Fractions of pig Slurry, Materials Engineering, Vol. 5 no. 2 (1994), pp. 375-81.

Brief Summary Text (27):

U.S. Pat. No. 5,549,730 relates to a compression molded tablet fertilizer capable of slowly releasing active ingredients and is suitable for use in horticulture and afforestation, and a method for the production thereof.

Detailed Description Text (17):

Clinoptilolite, a natural zeolite, is an example of an efficient and preferred ammonia adsorbing zeolite that can be used to treat the sludge that is discharged from the gas reactors. The use of ammonia adsorbing zeolite in the nutrient recovery process permits the reduction of acrid odors. In addition, odor can be controlled more effectively if an ammonia adsorbing zeolite is added to the livestock feed. The choice of preferred zeolites in this invention is also determined by the required characteristics of the fertilizer that is produced from the organic waste. For example, K--Ca clinoptilolites are excellent for soil conditioning as opposed to Na clinoptilolites. Other zeolites that retain ammonia include chabasite and phillipsite. Because natural sources of zeolites sometimes contain mixtures of zeolites instead of one single zeolite and some zeolites share several common characteristics, the term "zeolite" in this context will refer to one zeolite and also to a mixture of zeolites with desired properties. Analogously, reference to a specific zeolite by name in the context of this specification and appended claims is to be understood as referring to named specific zeolites and also to a mixture of zeolites with the desired properties in which the specifically named zeolite is a significant component.

Other Reference Publication (9):

Piccinini, Application of Phillipsite Rich Zeolite During the Composting of Solid Fractions of Pig Slurry, Material Engineering, vol. 5, n.2, pp. 375-381, 1994.

## CLAIMS:

20. The method recited in claim 19, wherein said zeolite is selected from the group consisting of clinoptilolite, chabasite, phillipsite, and mixtures thereof.

**WEST**

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L9: Entry 7 of 13

File: USPT

May 4, 1999

DOCUMENT-IDENTIFIER: US 5900387 A

TITLE: Method of and products for promoting improved growth of plants and more water-efficient growing soil or other media and the like with zeolite crystals treated with preferably water-based plant-derived nutrient extractions and the like

Brief Summary Text (10):

It has been reported that Japanese farmers have attained significant crop production improvements when zeolites were added to coarse fertilized soils, and that experiments at the Department of Agronomy at Colorado State University have led to the conclusion that relatively high application rates of zeolites are required to restrict leaching losses of  $\text{NH}_4^+$ , as from fertilizer in the soil, thereby reducing the loss of nitrogen therefrom and also neutralizing low pH soils. ("Agronomic and Horticultural Uses of Zeolites: A Review", K. A. Barbarick and H. J. Pirila, *Zeo Agriculture and Aquaculture*, edited by Wilson G. Pond and Frederick A. Mumpton, West View Press, Boulder, Colo., 1984 (International Committee on Natural Zeolites), pp. 93-103; and pp. 113-122, "Use Of Clinoptilolite In Combination With Nitrogen Fertilization To Increase Plant Growth", H. J. Pirela et al; and pp. 263-271, "Application Of Clinoptilolite To Soil Amended With Municipal Sewerage Sludge", M. A. Wilson et al; and references cited in these papers.

Detailed Description Text (2):

Three identical pot compartments were provided for each of the tests hereindescribed, using a mixture of Hyponex All-Purpose Potting Soil (Hyponex Corp. Marysmith, Ohio) and Peters Professional Potting Soil (Grace Sierra Horticultural Products, Co., Milipitas, Calif.), using the same number (6) of "catgrass" seeds (sorghum-sudangrass) in each pot. As in the above-cited references, the fast-growing characteristics and generic plant characteristics of this grass commended its use in these experiments. The three-set pots contained zeolite crystals dispersed throughout the soil, with two cation exchange zeolites selected--one (A) sold under the trademark "Ammono-Chips", Product 79A of Aquarium Pharmaceuticals Inc. of Calfort, Pa.--clinoptilolite--and the other (B) sold by the same company under the trademark "AmmonoCarb" containing also activated carbon. The crystals were coarsely crushed and the volume ratios of soil to zeolite crystals were up to about 1-0.3.

Detailed Description Text (23):

Phillipsite cationic exchange zeolite and also erionite may be substituted in the above examples and/or combinations of the same, and together with clinoptilolite, etc. if desired.

**WEST**

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L9: Entry 8 of 13

File: USPT

Sep 19, 1995

DOCUMENT-IDENTIFIER: US 5451242 A

TITLE: Active synthetic soil

Abstract Text (1):

A synthetic soil/fertilizer for horticultural application having all the agronutrients essential for plant growth is disclosed. The soil comprises a synthetic apatite fertilizer having sulfur, magnesium and micronutrients dispersed in a calcium phosphate matrix, a zeolite cation exchange medium saturated with a charge of potassium and nitrogen cations, and an optional pH buffer. Moisture dissolves the apatite and mobilizes the nutrient elements from the apatite matrix and the zeolite charge sites.

Brief Summary Text (2):

The present invention relates to an active synthetic soil for horticulture. More particularly the present invention relates to an active synthetic soil made from synthetic apatite and natural zeolite having a complete spectrum of agronutrients necessary for plant growth.

Brief Summary Text (4):

Synthetic soils for horticulture (i. e., solid substrates for plant support) include two general categories--inert and active. Inert substrates are commonly used in nutriculture (e. g., hydroponics) and are designed to provide mechanical support, proper root aeration and drainage. Quartz sand is a good example of an inert soil. Plant nutrients are added separately as, for example, liquid fertilizers such as Hoagland's solution. Soils which are defined as "active" have the ability to provide nutrient retention and release (i. e., incorporate fertilizing capability) in addition to the other primary soil functions of the above mentioned inert soils.

Brief Summary Text (7):

The use of zeolites as a major soil component has a relatively recent past. U.S. Pat. No. 4,337,078 to Petrov et al. describes the use of a natural zeolite clinoptilolite with vermiculite and peat in a synthetic soil. The term zeaponics has been coined to describe synthetic soils containing zeolites in horticulture.

Brief Summary Text (29):

The present invention provides a synthetic soil and fertilizer composition for horticulture which contains an entire spectrum of nutrients essential for plant growth. The soil combines a cation exchange medium charged with ammonium and potassium exchange cations and a synthetic apatite composition comprising magnesium, sulfur and plant micronutrients. The synthetic apatite unlike natural varieties is essentially free of toxic elements. The presence of moisture mobilizes the plant nutrients at a slow, steady rate. In addition, the nutrient release rate can be closely tailored to the horticultural requirements. These features and others offer potential for use in lunar agriculture applications.

Brief Summary Text (30):

In one embodiment, the present invention provides a slow-release fertilizer. The fertilizer is made from a synthetic apatite comprising matrix of calcium phosphate having a dispersion of one or more agronutrients and a cationic exchange medium having a charge of one or more agronutrients. The apatite and cationic exchange medium are preferably essentially free of agROTOXINS, such as, for example, fluorine, cadmium and sodium, in amounts detrimental to the growth of most plants.

Agronutrients include, for example, potassium, ammonium-nitrogen, magnesium, sulfur, zinc, chlorine, iron, manganese, copper, molybdenum and/or boron. The fertilizer can further include a pH buffer to maintain a pH balance of from about 5.5 to about 7. The cationic exchange medium can comprise natural or synthetic zeolite, phyllosilicate or a combination thereof including clinoptilolite, chabazite, mordenite, phillipsite, Linde type A, Linde type X, vermiculite, smectite or a combination thereof. The cation exchange medium has a cation exchange capacity (CEC) of at least 50 cmol.sub.c /kg, preferably at least 100 cmol.sub.c /kg, and more preferably at least 150 cmol.sub.c /kg. The cation exchange medium preferably has a charge of ammonium and potassium ions at a weight ratio of from about 1 to about 5:1 of ammonium:potassium. The fertilizer preferably comprises from about 5 to about 100 parts by weight of the synthetic apatite per 100 parts by weight of the cationic exchange medium.

Brief Summary Text (40):

In another embodiment, the present invention provides a horticultural method. In one step, a botanical species is planted in a sufficient amount of the fertilizer composition described above. In another step, the fertilizer is contacted with moisture to mobilize the agronutrients.

Detailed Description Text (2):

An entire spectrum of essential agronomic nutrients including nitrogen, potassium, magnesium, sulfur and micronutrients are incorporated into an active synthetic soil for horticulture. Upon contact by moisture, the nutrients are slowly released, as required, for plant use. In addition, a fertilization rate can be controlled and the soil tailored to horticultural needs.

Detailed Description Text (15):

Representative examples of common natural zeolites include clinoptilolite (Na.sub.3, K.sub.3){Al.sub.6 Si.sub.30 O.sub.72 }.24H.sub.2 O, chabazite (Na.sub.2, Ca).sub.6 {Al.sub.12 Si.sub.24 O.sub.72 }.40H.sub.2 O, mordenite Na.sub.8 {Al.sub.8 Si.sub.30 O.sub.96 }.24H.sub.2 O, phillipsite (Na,K).sub.5 {Al.sub.5 Si.sub.11 O.sub.32 }.20H.sub.2 O, and the like.

Detailed Description Text (40):

The present fertilizing soil can be used in conventional agronomic applications by direct addition by conventional means to a suitably prepared field but is preferably used in horticultural applications such as zeoponics and hydroponics.

Detailed Description Text (52):

The foregoing description of the soil composition and horticultural method is illustrative and explanatory thereof. Various changes in the materials, particular components and steps employed will occur to those skilled in the art. It is intended that all such variations within the scope and spirit of the appended claims be embraced thereby.

Other Reference Publication (27):

Hersey et al., Horticulture Science, 15:87-89, 1980. No Month.

CLAIMS:

20. A horticultural method, comprising the steps of:

planting a botanical species in a sufficient amount of the synthetic soil of claim 19; and

contacting the soil with moisture to mobilize the agronutrients.

22. A horticultural method, comprising the steps of:

planting a botanical species in a sufficient amount of the soil of claim 21; and

contacting the soil with moisture to mobilize the agronutrients.

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L9: Entry 9 of 13

File: USPT

Jan 22, 1991

DOCUMENT-IDENTIFIER: US 4986989 A  
TITLE: Zeolite fungicide

Abstract Text (1):

A novel agricultural and horticultural fungicide is disclosed. It contains as an active ingredient at least one crystalline zeolite selected from the group consisting of faujasite group, chabazite group and phillipsite group represented by the formula,

Brief Summary Text (1):

The present invention relates to an agricultural and horticultural fungicide containing as an active ingredient at least one crystalline zeolite selected from the group consisting of faujasite group, chabazite group and phillipsite group represented by the formula (I) (hereinafter referred to as the present substance),

Brief Summary Text (3):

Among the present substances, what is particularly superior in terms of the controlling activity is at least one crystalline zeolite selected from the group consisting of faujasite group and phillipsite group represented by the formula,

Brief Summary Text (8):

JP-A-59-186908 discloses that a product obtained by copper ion exchange of aluminosilicate can be used as an agricultural and horticultural fungicide. In reality, however, the copper-containing aluminosilicate disclosed in the above literature does not have a strong fungicidal activity per copper content and it cannot compensate the defect of the conventional inorganic copper-containing chemicals.

Brief Summary Text (11):

A great improvement in the activity per copper content results in various advantages in controlling crop diseases. That is, since the agricultural and horticultural fungicide of the present invention exhibits an excellent activity against various plant diseases, it has a number of advantages as follows:

Brief Summary Text (15):

Because the present substance exhibits an excellent effect against plant diseases, it can be used in various applications as an active ingredient for agricultural and horticultural fungicides.

Brief Summary Text (17):

The present substance can be used as an agricultural and horticultural fungicide in plow fields, paddy fields, orchards, tea gradens, pastures, turfs, etc. Also, the present substance can be used in mixture with other fungicides, insecticides, acaricides, nematocides, herbicides, plant growth regulators and fertilizers.

Brief Summary Text (21):

The application method for the agricultural and horticultural fungicide of the present invention includes for example foliage application, soil treatment, seed disinfection, etc., but usually, the present fungicide may be used by any method used by those skilled in the art.

Brief Summary Text (22):

When the present substance is used as an active ingredient for agricultural and horticultural fungicides, the dosage rate of the active ingredient varies with crops to be protected, diseases to be controlled, degree of outbreak of diseases, preparation forms, application methods, application time, weather conditions, copper contents, etc., but it is usually from 0.3 to 600 g/are, preferably from 0.3 to 300 g/are. When the wetttable powders, suspension formulations, etc. are applied in dilution with water, the application concentration of the present substance is from 0.015 to 1.5%, preferably from 0.03 to 0.6%. The dusts, granules, etc. are applied as they are without dilution.

Brief Summary Text (35):

Next, the usefulness of the present substance as an agricultural and horticultural fungicide are shown with reference to the following test examples.

Brief Summary Text (46):

The X-ray diffractometry demonstrated that the powdery substance thus obtained was crystalline zeolite belonging to phillipsite group. The elementary analysis showed that the atomic ratio of Si to Al was 1.91 and the copper content was 3.8 wt.%. The electron microscopic measurement showed that the average particle diameter was 2.0  $\mu\text{m}$ . This substance has the formula,  $0.32\text{CuO} \cdot 0.68\text{Na} \cdot 2\text{O} \cdot \text{Al} \cdot 2\text{O} \cdot 3\text{SiO}_2 \cdot 7.79\text{H}_2\text{O}$ .

Brief Summary Text (51):

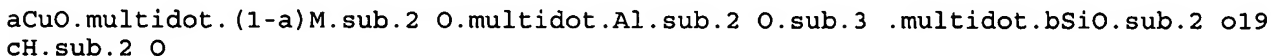
The X-ray diffractometry demonstrated that the powdery substance thus obtained was crystalline zeolite belonging to phillipsite group. The elementary analysis showed that the atomic ratio of Si to Al was 2.39 and the copper content was 3.2 wt.%. This substance has the formula,  $0.32\text{CuO} \cdot 0.68\text{Na} \cdot 2\text{O} \cdot \text{Al} \cdot 2\text{O} \cdot 3\text{SiO}_2 \cdot 9.48\text{H}_2\text{O}$ .

Brief Summary Text (57):

The X-ray diffractometry demonstrated that the powdery substance thus obtained was crystalline zeolite belonging to phillipsite group. The elementary analysis showed that the atomic ratio of Si to Al was 2.59 and the copper content was 3.4 wt.%. This substance has the formula,  $0.35\text{CuO} \cdot 0.65\text{Na} \cdot 2\text{O} \cdot \text{Al} \cdot 2\text{O} \cdot 3\text{SiO}_2 \cdot 9.79\text{H}_2\text{O}$ .

CLAIMS:

1. An agricultural and horticultural fungicide consisting essentially of a fungicidally effective amount of at least one crystalline zeolite selected from the group consisting of faujasite group and phillipsite group represented by the formula

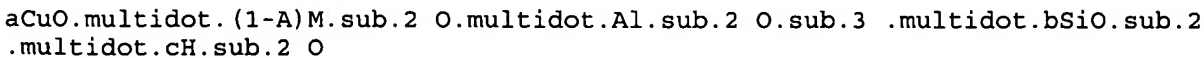


wherein M represents sodium and/or potassium, and

a is a number greater than 0 and less than or equal to 1, b is a number greater than 3 and less than or equal to 12, and c is a number greater than or equal to 0 and less than or equal to 20,

together with an inert carrier.

2. A method for controlling plant pathogenic fungi which comprises applying a fungicidally effective amount of at least one crystalline zeolite selected from the group consisting of faujasite group, and phillipsite group represented by the formula,



wherein M represents sodium and/or potassium,

a is a number greater than 0 and less than or equal to 1, b is a number greater than

3 and less than or equal to 12, and c is a number greater than or equal to 0 and less than or equal to 20,

to plant pathogenic fungi.

3. A method for controlling plant pathogenic fungi according to claim 2, which comprises applying a fungicidally effective amount of at least one crystalline zeolite selected from the group consisting of faujasite group and phillipsite group represented by the formula,

$$aCuO \cdot (1-a)M \cdot 2O \cdot Al \cdot 2O \cdot 3SiO \cdot 2CH \cdot 2O$$

Wherein M represents sodium and/or potassium,

a is a number greater than 0 and less than or equal to 1, b is a number greater than 3.5 and less than 8, and c is a number greater than or equal to 0 and less than or equal to 20

to plant pathogenic fungi.

4. An agricultural and horticultural fungicidal composition consisting essentially of a fungicidally effective amount of at least one crystalline zeolite selected from the group consisting of faujasite group and phillipsite group represented by the formula,

$$aCuO \cdot (1-a)M \cdot 2O \cdot Al \cdot 2O \cdot 3SiO \cdot 2CH \cdot 2O$$

wherein M represents sodium and/or potassium, and a is a number greater than 0 and less than or equal to 1, b is a number greater than 3 and less than or equal 12 and c is a number greater than or equal to 0 and less than or equal to 20, and

an inert carrier selected from the group consisting of kaoline clay, attapulgite clay, bentonite, terra alba, pyrophyllite, talc, diatomaceous earth, calcite, corn stalk powder, walnut shell powder, urea, ammonium sulfate, synthetic hydrated silicon dioxide, calcium lignosulfonate, sodium lauryl sulfate, polyoxyethylene sorbitan monooleate, carboxymethyl cellulose and water.

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☐ 1. Document ID: EP 173340 A AU 8546852 A DE 3574162 G EP 173340 B ES 8606488 A ZA 8506623 A

L13: Entry 1 of 1

File: DWPI

Mar 5, 1986

DERWENT-ACC-NO: 1986-063221

DERWENT-WEEK: 198610

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TITLE: Culturing microorganisms on nutrient medium contg. zeolite - esp. for slow sand filter, fermentation broth or slurry broth

INVENTOR: CURRIER, J W; HULBERT, M H

PRIORITY-DATA: 1984US-0645369 (August 29, 1984)

## PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
EP 173340 A	March 5, 1986	E	045	
AU 8546852 A	March 6, 1986		000	
DE 3574162 G	December 14, 1989		000	
EP 173340 B	November 8, 1989	E	000	
ES 8606488 A	October 1, 1986		000	
ZA 8506623 A	May 22, 1986		000	

INT-CL (IPC): B01D 0/00; C01B 33/28; C02F 3/10; C12N 1/38; C12N 5/02

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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L13: Entry 1 of 1

File: DWPI

Mar 5, 1986

DERWENT-ACC-NO: 1986-063221

DERWENT-WEEK: 198610

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TITLE: Culturing microorganisms on nutrient medium contg. zeolite - esp. for slow sand filter, fermentation broth or slurry broth

### Basic Abstract Text (1):

Microorganisms are cultured in a nutrient medium to which has been added an amt. of a zeolite to enhance the growth of the microorganisms. Claimed zeolites are clinoptilolite, phillipsite or mordenite.

### Equivalent Abstract Text (1):

Microorganisms are cultured in a nutrient medium to which has been added an amt. of a zeolite to enhance the growth of the microorganisms. Claimed zeolites are clinoptilolite, phillipsite or mordenite.